UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/830,493	09/04/2001	Hideki Kuramitsu	43890-509	8182

8

20277 7590 05/07/2003

MCDERMOTT WILL & EMERY
600 13TH STREET, N.W.
WASHINGTON, DC 20005-3096

EXAMINER
MAYES, MELVIN C

ART UNIT	PAPER NUMBER
1734	

DATE MAILED: 05/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/830,493	KURAMITSU ET AL.	
	Examiner	Art Unit	
	Melvin Curtis Mayes	1734	

-- The MAILING DATE of this communication app ars on the cover sheet with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-21 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-21 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102 and 103

(1)

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(2)

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

(3)

Claims 1 and 4-7 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Sanada et al. 4,497,677.

Sanada et al. disclose a method for manufacturing a ceramic substrate comprising: making green sheets of ceramic powder and organic binder; pressing and heating each of the green sheets to a temperature and pressure to effect dimensional stabilization of said green sheets; forming a conductor on the surface of each of the green sheets by printing paste-like conductor; laminating the green sheets under heat and pressure; and sintering the laminated green sheets. During heating and pressing to effect dimensional stabilization, uniform compaction of the green sheet composition is performed and the green sheet composition is packed more densely. The pressure and temperature used in the laminating process should be higher than those used for the dimensional stabilization treatment. The temperature during dimensional stabilization allows sufficient softening of the organic binder in the green sheets (col. 1-col. 4).

Further by heating and pressing during dimensional stabilization treatment such that the green sheet composition is packed more densely, a reduction of porosity of the green sheet (ceramic sheet) by applying a pressing force is obviously performed, as claimed in Claim 1.

Further by heating during dimensional stabilization to a temperature which allows sufficient softening of the organic binder in the green sheets, heat treatment during dimensional stabilization is obviously carried out at a temperature between the glass transition temperature and melting point of an organic material contained in the green sheet, as claimed in Claim 7.

(4)

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sanada et al. as applied to claim 1 above, and further in view of Chiao 5,540,884.

Chiao teaches that organic binders in green ceramic green sheets should promote preparation of flexible green sheets and readily pyrolyze without leaving an undesirably high level of residual carbon. Chiao teaches that organic binders which provide satisfactory results include polyethylene (col. 4, lines 1-15).

It would have been obvious to one of ordinary skill in the art to have modified the method of Sanada et al. by providing the organic binder in the green sheets as polyethylene, as taught by Chiao, as an organic binder for green sheets which provides satisfactory results of promoting preparation of flexible green sheets and readily pyrolyzing without leaving an undesirably high level of residual carbon.

(5)

Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 11-111560 in view of Sanada et al.

JP 11-111560 discloses a method of making a ceramic electrical component such as a capacitor or multilayer substrate comprising: providing ceramic sheets of dielectric powder and polyethylene organic binder; providing electrodes on the ceramic sheets using a metal paste; laminating the ceramic sheets under temperature and pressure; and sintering. The ceramic sheets have a porosity less than 80% and more than 30% (computer translation). JP 11-111560 does not disclose making a reduction of porosity in the individual ceramic sheets by applying pressing force to the individual ceramic sheets before providing internal electrodes.

Sanada et al. teach that in manufacturing a ceramic substrate from laminating ceramic green sheets, to minimize dimensional change of the green sheets, before the green sheets are provided with conductor paste, the green sheets are each pressed under temperature to remove residual stress and remaining solvents in the green sheet as well as perform uniform compaction of the green sheet composition and at temperature to allow softening of the organic binder in the green sheet with the result that the composition is sufficiently homogenized and packed more densely. Sanada et al. teach that the pressure and temperature for hot pressing in the lamination of the green sheets should be higher than those used for dimensional stabilization in order to embed the conductor layer, too high a pressure during dimensional stabilization packing the sheet to densely to allow the elimination of binder during sintering (col. 2, line 1 – col. 4, line 5).

It would have been obvious to one of ordinary skill in the art to have modified the method of JP 11-111560 for making a ceramic electrical component such as a capacitor or multilayer substrate by pressing each individual ceramic sheet under heat and pressure before providing the ceramic sheets with paste electrodes, as taught by Sanada et al., to minimize dimensional change of the ceramic sheets. By pressing each ceramic sheet under heat and pressure for dimensional stabilization to remove residual stress and remaining solvents in the green sheet as well as perform uniform compaction of the green sheet composition and allow softening of the organic binder in the green sheet with the result that the composition is sufficiently homogenized and packed more densely, as taught by Sanada et al., each ceramic sheet is obviously pressed making a reduction of porosity in the ceramic sheet, as claimed.

Providing the ceramic sheets with porosity of 50% or more before dimensional stabilization or within the range of less than 50% after dimensional stabilization would have been

obvious to one of ordinary skill in the art, as JP '560 discloses that the porosity of the ceramic sheets to be laminated should be in the range of 30-80%.

Applying the pressure during dimensional stabilization as less than the pressure applied during laminating the ceramic sheets, as claimed in Claim 5, would have been obvious to one of ordinary skill in the art, as taught by Sanada et al., because the pressure and temperature for hot pressing in the lamination of the green sheets should be higher than those used for dimensional stabilization to embed the conductor layer, too high a pressure during dimensional stabilization packing the sheet to densely to allow the elimination of binder during sintering.

Heating the ceramic sheet during dimensional stabilization to a temperature between the glass transition temperature and melting point of an organic material contained in the green sheet, as claimed in Claim 7, would have been obvious to one of ordinary skill in the art, as taught by Sanada et al., to heat the ceramic sheet to a temperature which allows sufficient softening of the organic binder in the green sheets with the result that the composition is sufficiently homogenized and packed more densely.

(6)

Claims 8-14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 1-7 above, and further in view of either JP 2-42797 Abstract or JP 10-200260 Abstract.

JP 2-42797 teaches that high quality patterns are formed with precision to obtain a multilayer ceramic board having high density and fine patterns by printing the pattern of conductive paste on a transfer film and transferring the pattern to a green sheet to be laminated with a plurality of green sheets (Abstract)

JP 10-200260 teaches that high-precision circuit pattern is easily formed on a green sheet for making a multilayer board by forming the circuit pattern onto a film support 1 by paste and transferring the pattern onto the green sheet (Abstract).

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined by providing metal paste electrodes or patterns on the ceramic sheets for making a capacitor or multilayer substrate by forming the conductive paste patterns on films and transferring the patterns to the ceramic sheets, as taught by JP '797 or JP '260, to form high quality or high precision circuit patterns on green sheets for making a multilayer board. Transferring the metal paste conductive layers from transfer films to the ceramic sheets instead of printing directly on the ceramic sheets would have been obvious to one of ordinary to form high precision patterns, as taught by JP '797 or JP '260.

(7)

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 8 above, and further in view of Kondo et al.

Kondo et al. teach that conductor paste for multilayer substrates made from green sheets comprises 10 parts by weight binder for 100 parts by weight of metal powder (col. 4, lines 12-21).

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined by providing the metal paste for forming the electrodes or patterns as 10 wt% binder for 100 wt% metal powder, as taught by Kondo et al., for conductor paste used to make multilayer substrates from green sheets.

(8)

Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Breton et al. 4,194,040.

Breton et al. disclose a method of making a capacitor comprising: intercalating layers of dielectric material between conductor layers. Breton et al. disclose that the layers are made by providing a matrix of fibrillated polytetrafluoroethylene interconnecting and entrapping a high volume, at least 85%, of a particulate of a sinterable material such as metal or ceramic. Breton et al. disclose that metal and ceramic articles can be sintered. Breton et al. disclose that the matrix of fibrillated polytetrafluoroethylene is a three-dimensional cobweb-like structure or non-woven mat of intertwined fibrils which interconnect and entrap the individual particles of the sinterable particulate (col. 1-14).

By forming the layers of dielectric material and conductor layers of a matrix of fibrillated polytetrafluoroethylene interconnecting and entrapping a high volume of a sinterable particulate of ceramic and metal, respectively, the layers of dielectric material have an organic material arranged horizontally in a mesh-like structure and the organic material and ceramic powder are arranged horizontally in a mesh-like structure and at random in the thickness direction, because Breton et al. disclose that the matrix of fibrillated polytetrafluoroethylene is a three-dimensional cobweb-like structure or non-woven mat of intertwined fibrils which interconnect and entrap the individual particles of the sinterable particulate.

(9)

Claims 17-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mandai et al. in view of Breton et al. 4,194,040.

Mandai et al. disclose a method of manufacturing a laminated ceramic electronic component such as capacitor comprising: providing internal electrodes on a back film by a thin film forming method; transferring the electrodes to green sheets from the back film; stacking green sheets; and baking (col. 2-4). Mandai et al. do not disclose the green sheets having organic material arranged horizontally in a mesh-like structure and the organic material and ceramic powder are arranged horizontally in a mesh-like structure and at random in the thickness direction.

Breton et al. teach that a sheet of high green strength and low moduli of elasticity of a sinterable ingredient such as ceramic particulate which can be shaped and sintered for use in making articles such as electronic components such as a capacitor is made by providing a matrix of fibrillated polytetrafluoroethylene interconnecting and entrapping a high volume, at least 85%, of the sinterable particulate. Breton et al. teach that the matrix of fibrillated polytetrafluoroethylene is a three-dimensional cobweb-like structure or non-woven mat of intertwined fibrils which interconnect and entrap the individual particles of the sinterable particulate (col. 1-14).

It would have been obvious to one of ordinary skill in the art to have modified the method of Mandai et al. for making a laminated capacitor of electrodes and ceramic green sheets by providing the green sheets as made of a matrix of fibrillated polytetrafluoroethylene interconnecting and entrapping a high volume of the ceramic particulate, as taught by Breton et

al., for making a sheet of high green strength and low moduli of elasticity of a sinterable ingredient which can be shaped and sintered for use in making articles such as electronic components such as a capacitor. By forming the green sheets of a matrix of fibrillated polytetrafluoroethylene interconnecting and entrapping a high volume of the sinterable ceramic particulate, the green sheets have an organic material arranged horizontally in a mesh-like structure and the organic material and ceramic powder are arranged horizontally in a mesh-like structure and at random in the thickness direction, because Breton et al. disclose that the matrix of fibrillated polytetrafluoroethylene is a three-dimensional cobweb-like structure or non-woven mat of intertwined fibrils which interconnect and entrap the individual particles of the sinterable particulate.

Allowable Subject Matter

(10)

The specification sets forth that the ceramic sheets are formed of polyethylene fibers extending horizontally in a mesh-like structure and at random in the thickness direction, with ceramic particles absorbed in the mesh so as to be also arranged extending horizontally in a mesh-like structure and at random vertically. The claims would be allowable if amended to include this limitation.

Conclusion

(11)

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Neuffer T909,004 discloses subjecting green sheets to pressure for thickness reduction and densification to control anisotropic firing shrinkage.

(12)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melvin Curtis Mayes whose telephone number is 703-308-1977. The examiner can normally be reached on Mon-Fri 7:30 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on 703-308-3853. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Melvin Curtis Mayes
Primary Examiner
Art Unit 1734

MCM
May 2, 2003